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File: PGPB

Feb 14, 2002

PGPUB-DOCUMENT-NUMBER: 20020019802
PGPUB-FILING-TYPE: new
DOCUMENT-IDENTIFIER: US 20020019802 A1

TITLE: System and methods for aggregation and liquidation of curtailment energy resources

PUBLICATION-DATE: February 14, 2002

INVENTOR-INFORMATION:

| NAME | CITY | STATE | COUNTRY | RULE-47 |
|---------------------|---------|-------|---------|---------|
| Malme, Ross | Atlanta | GA | US | |
| Scarpelli, Peter C. | Chicago | IL | US | |

APPL-NO: 09/ 954852 [PALM]
DATE FILED: September 18, 2001

RELATED-US-APPL-DATA:

Application is a non-provisional-of-provisional application 60/223419, filed August 7, 2000,

INT-CL: [07] G06 F 17/60

US-CL-PUBLISHED: 705/37

US-CL-CURRENT: 705/37

REPRESENTATIVE-FIGURES: 1

ABSTRACT:

The virtual utility manager ("VUM") is a focal point for the aggregation and liquidation of curtailment energy assets. The VUM receives curtailment energy commitments from energy consumers or load-supplying entities (LSEs) who have executed load curtailment contracts with energy consumers. These load-supplying entities as well as energy consumers desire the ability to market their curtailment assets. The VUM can aggregate the commitments and provide the aggregate energy commitments to energy market participants. The VUM also monitors curtailment performance and provide this monitoring information to the involved participants.

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] The following U. S. Patent Application claims priority under 35 U.S.C. .sctn.119 to United States Provisional Application number 60/223,419 filed on Sep. 18, 2000.

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L3: Entry 2 of 2

File: PGPB

Feb 14, 2002

PGPUB-DOCUMENT-NUMBER: 20020019758
PGPUB-FILING-TYPE: new
DOCUMENT-IDENTIFIER: US 20020019758 A1

TITLE: Load management dispatch system and methods

PUBLICATION-DATE: February 14, 2002

INVENTOR-INFORMATION:

| NAME | CITY | STATE | COUNTRY | RULE-47 |
|---------------------|---------|-------|---------|---------|
| Scarpelli, Peter C. | Chicago | IL | US | |

APPL-NO: 09/ 795371 [PALM]
DATE FILED: February 28, 2001

RELATED-US-APPL-DATA:

Application is a non-provisional-of-provisional application 60/223742, filed August 8, 2000,

INT-CL: [07] G06 F 17/60

US-CL-PUBLISHED: 705/7; 705/1

US-CL-CURRENT: 705/7; 705/1

REPRESENTATIVE-FIGURES: 1

ABSTRACT:

The load management dispatcher ("LMD") monitors the fluctuating prices of energy and compares the market price to the economic opportunity provided to the energy consumer by curtailment of the consumer's consumption. The LMD can provide notification that the curtailment opportunity exists due to a peak in energy prices. Thus, LMD can perform an economic dispatch of distributed generation and load curtailment assets. The LMD can provide current market prices as well as the notification and acceptance of curtailment opportunities. Additionally, LMD can include the ability to monitor in near real time the energy consumption of the consumers and may be able to directly enact the energy curtailment.

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] The following U.S. patent application claims priority under 35 U.S.C. .sectn. 119 to U.S. Provisional Application Ser. No. 60/223,742 entitled "Load Management Dispatcher" filed on Aug. 8, 2000.

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L5: Entry 6 of 11

File: PGPB

Jan 17, 2002

DOCUMENT-IDENTIFIER: US 20020007388 A1

TITLE: Energy service business method and system

Summary of Invention Paragraph:

[0012] The amount received by the energy service enterprise should preferably be determined with reference to the operating hours or the operating rate of the object equipment. When the quantity of energy curtailment is under a predetermined reference value, the energy service enterprise provides maintenance or improvement without compensation of the equipment to which the energy saving is applied so as to satisfy the reference value.

Summary of Invention Paragraph:

[0018] In this case, the amount collected by the energy service enterprise is determinable on the basis of the operating hours or the operating rate of the energy-saving object equipment or the energy-saving equipment. The energy service enterprise can receive an amount of collection in response to an amount of energy cost curtailment calculated periodically (every three months, for example).

Summary of Invention Paragraph:

[0019] When the quantity of energy curtailment is smaller than an assured value, the energy service enterprise performs maintenance of the energy-saving equipment or improvement thereof so as to satisfy the assured value.

Summary of Invention Paragraph:

[0020] The customer and the energy service enterprise may share the installation cost of the energy-saving equipment to install the same. In this case, the energy service enterprise receives an amount calculated by distributing the amount of energy cost curtailment in accordance with the share thereof.

Summary of Invention Paragraph:

[0021] A second form of management of the invention is characterized in that the energy service enterprise drafts a plan and executes energy-saving measures and assures an energy-saving effect, i.e., an amount of energy cost curtailment, irrespective of whether or not the energy service enterprise contributes investment funds for the energy-saving measures. More specifically, this process comprises the steps of drafting energy-saving measures by the energy service enterprise or a related organization thereof; assuring, under certain conditions, a quantity of curtailment of energy consumption available when taking energy-saving measures in accordance with the thus drafted measures; measuring the energy consumption after taking the energy-saving measures; calculating the amount of curtailment of energy costs by comparing the thus measured value with the energy consumption before taking the energy-saving measures previously stored in a database, and periodically confirming the assured quantity of curtailment.

Summary of Invention Paragraph:

[0023] When the quantity of curtailment is under the assured value, the energy service enterprise should preferably perform maintenance of the energy-saving equipment or improvement thereof so as to satisfy the assured value. In this case, it is desirable that the energy service enterprise can receive a compensation in an amount corresponding to the quantity of energy curtailment in excess of the assured

value in reward for assuring a quantity of energy curtailment, or as a cost to be appropriated for maintenance and improvement.

Summary of Invention Paragraph:

[0024] The method of business as described above can be achieved by adopting a system comprising a database which stores past data about the energy consumption before taking energy-saving measures; measuring means which measures the energy consumption after taking energy-saving measures; and calculating means which calculates the energy curtailment quantities before and after taking energy-saving measures by incorporating measurement data measured by the measuring means via a communication line and comparing the measurement data and the past data stored in the database.

Summary of Invention Paragraph:

[0026] The calculating means calculates the amount of curtailment of the energy costs on the basis of the energy curtailment quantity, and issues a bill demanding payment of an amount obtained by multiplying the amount of curtailment by a predetermined ratio.

Detail Description Paragraph:

[0047] Then, a plan of energy-saving measures is drafted. First, a basic plan of energy-saving measures by setting basic conditions for the installation space for the energy-saving facilities, amount of investment, electric power under contract, number of years of depreciation, impact on environments, and future expansion plan. Electric power under contract is set because the power unit price varies with the electric power under contract. The energy-saving measures include replacement of existing facilities by energy-saving type new facilities, addition of energy-saving facilities, proposal of maintenance for energy conservation, and proposal of management and control of facilities for energy saving.

Detail Description Paragraph:

[0056] After thus planning concrete energy-saving measures, the curtailment effort of the energy consumption is tentatively calculated for the case when these energy-saving measures are taken. In this case, the effect thereof on environments is taken into account, and at the same time, labor saving and achievement of a higher efficiency are accomplished for the control of the energy facilities.

Detail Description Paragraph:

[0065] After implementation of the energy-saving measures, the energy service enterprise carries out management and control of services for the energy-saving measures including surveillance of the energy-saving equipment, verification of the energy-saving effects, maintenance and improvement. More specifically, the energy consumption after taking energy-saving measures, and voltage, current, flow rate of fuel, flow rate of a fluid such as coolant and temperature necessary for calculating the energy consumption are periodically (for example, every 15 minutes or every hour) measured, and recorded as measured data. Attribute data such as load on the object facilities, temperature and humidity are measured in parallel with this, and recorded together with the measured data including the energy consumption. The quantity of energy curtailment is calculated by comparing the same or substantially the same measured with past data previously stored in the database. If there is not found the same substantially the same data, approximation is performed through interpolation or extrapolation. The amount of curtailed energy cost is calculated on the basis of the thus calculated quantity of curtailed energy and the energy unit price set forth in the contract. Dividend is calculated periodically (for example, monthly, every three to 12 months), on the basis of this amount of curtailment. The energy-saving effect is reported to the customer, and payment of the dividend is demanded.

Detail Description Paragraph:

[0066] When the quantity of energy curtailment is under a predetermined reference

value of an assured value, on the contrary, the energy service enterprise provides maintenance or improvement of the energy-saving equipment without compensation so as to satisfy the reference value. Control is performed so as to satisfy the assured value or the reference value of the quantity of curtailed energy by appropriately monitoring the data recorded through measurement of the energy consumption after taking the energy-saving measures, determining whether or not the energy-saving equipment displays, determining performance, and applying maintenance or the like as required.

Detail Description Paragraph:

[0096] If the energy-saving effect P surpasses the annual total expense Q , which means that the energy-saving measures pay, $P=Q$ would be the break-even-point. In order to obtain a profit as a business, $P>Q$ is preferable, and the number of contract years necessary for collection of investment funds is required to be up to ten years, or preferably five to six years. Because the amount of energy curtailment increases with the annual operating hours H , the number of contract years n can be reduced according as the annual operating hours H increase. The appropriateness of the number of contract years n is therefore determined using as a standard the annual number of operating hours B when $P=1.1 Q$.

Detail Description Paragraph:

[0114] The energy consumption for the object facilities and the energy consumption for management of the energy-saving equipment. Data necessary for this calculation include:

Detail Description Paragraph:

[0134] For the energy consumption or the measured data for the individual machines calculated in step S42, the past energy consumptions or past data of the corresponding machine are retrieved from the database, and the energy-saving effect, i.e., the quantity of energy curtailment is tentatively calculated by comparing these data.

Detail Description Paragraph:

[0142] The quantities of energy saving, i.e., the energy-saving effects for all the machines are added up in this step S48 to calculate the quantity of energy curtailment resulting from the energy-saving measures.

Detail Description Paragraph:

[0144] In this step, the planned value of the quantity of energy curtailment agreed upon between the energy service enterprise and the customer is compared for evaluation with the quantity of energy curtailment calculated in step S48.

Detail Description Paragraph:

[0170] It is confirmed whether or not the initially planned energy-saving effect is maintained by comparing the thus periodically determined current values and the characteristics shown in FIG. 14. An energy-saving effect over the planned value leads to a profit. If under the planned value, the machines are inspected, and when a malfunction is found, recovery of the functions is tried through maintenance or repair. As is evident from FIG. 14, adoption of inverter driving permitted energy curtailment corresponding to the shadowed portion in a case of a cooling water temperature of 32.degree. C. as compared with the case without an inverter.

Detail Description Paragraph:

[0173] The contract may take another form of assuring an energy-saving effect on the basis of the plan of energy-saving measures, and receiving payment of a certain amount of money from the customer in compensation for assessment. More specifically, the energy service enterprise or a related organization drafts a plan of energy-saving measures, assures a quantity of energy curtailment, under certain conditions, available when installing energy-saving facilities in accordance with the planned measures, measures the energy consumption after taking the energy-

saving measures, determines the difference of the measured value from the energy consumption before taking the energy-saving measures previously stored in the database, and confirms the assured quantity of curtailment periodically. When the assured value is satisfied, the energy service enterprise can receive compensation in a fixed amount or at a fixed rate in response to the amount of curtailed energy cost as a reward for successful achievement. When contributing investment funds, this enables the customer to introduce energy-saving facilities with confidence.

Detail Description Paragraph:

[0175] When the quantity of energy curtailment is under the assured value, the energy service enterprise performs maintenance of the energy-saving facilities so as to satisfy the assured value, or improves the energy-saving facilities. In this case, the contract should set forth that the energy service enterprise receives a compensation in response to the quantity of energy curtailment in excess of the assured value.

CLAIMS:

1. An energy service business system comprising: a database which stores past data about the energy consumption before taking energy-saving measures; measuring means which measures the energy consumption after taking energy-saving measures; and calculating means which calculates the energy curtailment quantities before and after taking energy-saving measures by incorporating measurement data measured by said measuring means via a communication line and comparing said measurement data and the past data stored in said database.
5. An energy service business system according to claim 1, wherein said calculating means calculates the amount of curtailment of the energy costs on the basis of said energy curtailment quantity, and issues a bill demanding payment of an amount obtained by multiplying said amount of curtailment by a predetermined ratio.
13. An energy service business method according to claim 9, wherein, when the quantity of energy curtailment is smaller than a predetermined reference value, said energy service enterprise performs maintenance or improvement without compensation of the equipment to which the energy-saving measures are applied so as to satisfy the reference value.
21. An energy service business method according to claim 16, wherein said energy service enterprise receives a compensation in an amount corresponding to the quantity of energy curtailment in excess of the assured value in reward for assuring a quantity of energy curtailment, or as a cost to be appropriated for maintenance or improvement.
23. An energy service business method according to claim 21, wherein, when the quantity of energy curtailment is under a predetermined reference value, said energy service enterprise performs maintenance or improvement of the equipment subjected to energy-saving measures without compensation so as to satisfy the reference value.

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L5: Entry 8 of 11

File: USPT

Nov 5, 1985

DOCUMENT-IDENTIFIER: US 4551812 A

TITLE: Energy controller and method for dynamic allocation of priorities of controlled load curtailment to ensure adequate load sharing

Brief Summary Text (2):

The invention relates to electrical energy management systems that shed and restore prioritized controlled loads in such a manner as to minimize peaking of power consumption of a residence with minimum impact on the life-style of residential occupants in order to maximize utility company revenue by keeping power consumption close to a level that utilizes as much as possible of the utility company's capacity to generate electrical power from hydroelectric, nuclear, coal-fired and other generating sources that have relatively low operating costs but require very large capital outlays to construct, thereby avoiding the need for the utility company to use oil or gas powered peak load generating sources that sharply increase the rates that must be charged to utility customers.

CLAIMS:

13. The method of claim 11 wherein said first predetermined amount is selected to cause said power limit to decrease at a rate that accurately adjusts said power limit in accordance with seasonal changes in average power usage by the user so that substantial money-saving energy curtailment occurs during seasonal periods of relatively low power-usage.

28. The system of claim 27 wherein said first predetermined amount is selected to cause said power limit to decrease at a rate than accurately adjusts said power limit in accordance with seasonal changes in average power usage by the user so that substantial money-saving energy curtailment occurs during seasonal periods of relatively low power usage.